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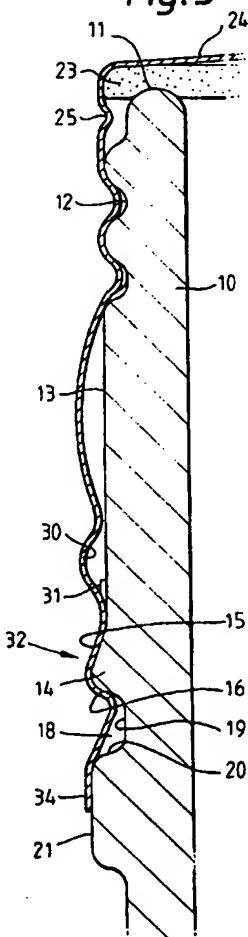
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(54) Metal threaded closure with tamperband and container.

(57) The screw-thread neck of a container, e.g. a glass bottle, has a closure with a tamper-evident ring 32 connected to the lower end of the skirt of the closure by frangible bridges 31. Opposite the ring, the neck finish of the container has a nose-shaped projection 14 the upper and lower flanks of which meet in a sharp edge, and has an annular groove 18 below the projection 14. The bridges 31 are formed in an inwardly facing groove 30 above the projection 14 and are radially spaced from the outer surface of the neck finish. The tamper-evident ring is swaged into close contact with the projection 14, is deformed into a channel 19 on the neck finish below projection 14, and is closely engaged with the surface 21 of the neck finish below the channel. Interference involving outward prising movement by a lever on the lower edge portion 34 of the ring to disengage the ring from groove 18 causes a pivoting action about the tip of projection 14 leading to fracture of the bridges.

Fig. 3



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This invention relates to container closures and more particularly to closures of the kind made from a malleable metal, e.g. aluminium alloy, having a tamper evident band and intended to be applied to a container neck by roll-on technique.

According to this invention in one aspect there is provided in combination, a container having a neck finish extending about a central axis of the container which neck finish provides a container mouth and an external screw thread adjacent the mouth, an annular outward projection which is spaced below the screw-thread and which is nose-shaped in cross-section said projection having a lower flank disposed at a small angle to a plane normal to said central axis and an upper flank extending at a larger angle to said plane, said upper and lower flanks meeting in substantially a sharp edge, and an annular groove below the projection and a roll-on metal closure comprising a top, a dependent skirt and a tamper-evident ring formed in one piece with the skirt and connected to the lower edge of the skirt by a series of frangible bridges, the skirt being deformed into engagement with the screw thread on the neck finish and the ring being deformed into close contact with the nose-shaped projection on the container and into engagement in said groove below the projection, and the bottom edge portions of the ring being deformed into close contact with the surface of the container, and said bridges being radially spaced from the outer surface of the container.

According to a preferred feature of the invention the lower end portion of the skirt and the upper end portion of the ring jointly provide a radially inwardly facing groove, the bridges being formed in a wall of the groove which is radially spaced from the outer surface of the neck finish. Preferably, the whole of the said end portions of the skirt and ring are radially spaced from the outer surface of the neck finish.

In another aspect the invention provides a container having a neck finish extending about a central axis of the container which neck finish provides a container mouth and an external screw thread adjacent the mouth, an annular outward projection which is spaced below the screw-thread and which is nose-shaped in cross-section, said projection having a lower flank disposed at a small angle to a plane normal to said central axis and an upper flank extending at a larger angle to said plane, said upper and lower flanks meeting in substantially a sharp edge.

The invention further provides a closure or closure blank made from sheet metal and comprising a top, a dependent skirt and a tamper-evident ring formed in one piece with the skirt and connected to the lower edge of the skirt by a series of frangible bridges, the ring being formed adjacent said bridges with an annular grooved formation a portion of which is capable of forming an annular fulcrum in conjunction with a complementary annular surface of a container to

which the closure or closure blank is to be applied such that radially outward force applied to the free lower edge portion of the ring causes the bridges and the portion of the ring above said groove to be deformed radially inwardly, said bridges being arranged to be radially spaced outward from the external surface of the container when the closure or closure blank is positioned thereon.

Some embodiments of the invention will now be described by way of example with reference to the accompanying diagrammatic drawings in which:

Figure 1 shows in elevation a container and closure blank according to the invention.

Figure 2 corresponds to Figure 1 but shows the closure in its fully applied state,

Figure 3 is a fragmentary sectional elevation of the container and the applied closure on an enlarged scale,

Figure 4 is a fragmentary axial sectional view of the neck finish of the container shown in Figure 3, and

Figures 5, 6 and 7 are views corresponding to Figures 1 to 3 respectively illustrating a second embodiment of the invention.

Referring first to Figure 3, the neck finish 10 of a glass bottle has an upper end surface 11, the edges of which are radiussed, and an adjacent helical groove 12 providing a screw-thread. Below the screwthread, the external surface of the neck has a plain cylindrical portion 13 at the lower end of which is an annular projection 14 of generally triangular or nose-like form. The upper surface 15 of projection 14 is inclined downward and outward at an angle not greater than about 70° to a plane normal to the central axis Y of the bottle, and the lower surface 16 is as nearly at right angles to the central axis of the bottle as is practicable having regard to the need to be able to disengage the neck finish from the mould. The angle should preferably not exceed 12° to said plane.

The corner between surfaces 16 and 15 will in practice be radiussed but should be as sharp as moulding techniques can contrive, subject to avoidance of splintering. The surface 16 extends inward beyond the cylindrical portion 13 and forms also the upper wall of an annular groove 18 having a generally cylindrical base wall 19 and a lower wall 20. From the radially outer edge of the wall 20, the external surface of the neck finish extends downward as a plain cylindrical surface 21 of substantially the same diameter as the projection 14.

Figure 1 shows a closure blank 22 resting on the neck of the container prior to the roll-on procedure. The blank has a compressible sealing gasket 23 disposed against the underside of its top 24, as shown in Figure 3 and retained in place by an impressed annular rib 25. The part 26 of the skirt above the rib 25 is knurled to provide a grip. Below the rib 25, the skirt has a short cylindrical portion which will be rolled

into conformity with the screw-thread groove 12, a longer convexly curved portion 29, and an inwardly facing groove 30, in the lower flank of which a ring of frangible bridges 31 is formed. The bridges effectively define the upper edge of a tamper-evident ring 32. Below the groove 30 is an outwardly facing groove 33, the upper flank of which is constituted by the lower flank of groove 30. Below groove 33, the bottom parts 34 of the ring are of plain cylindrical form and have a diameter such as to be a close fit about the cylindrical surface portion 21. To apply the closure to the neck, the closure blank is pressed downward to form a seal between the upper end 11 of the container and the gasket 23 and simultaneously rolling operations are carried out to swage portions of the skirt of the blank and tamper-evident ring into conformity with the profile of the neck finish. On completion of swaging, the relationship between the neck finish and the closure is as shown in Figure 3. Portion 28 then has a screw-thread profile, the base of groove 33 is disposed firmly in engagement with the surface of the bottle above the nose-shaped projection 14, and the bottom parts 34 are rolled into conformity with the nose-shaped projection 14 and the plain cylindrical surface 21 of the neck finish.

Any attempt to remove the closure without breaking the bridges 31 which involves the insertion of e.g., a blade-like implement between the bottom edge of the ring to disengage the ring from groove 18 will cause the bottom portions of the ring to pivot outward initially about the tip of the nose-shaped projection 14 and then about the base of groove 33. This action immediately places stress on the bridges 31 and causes them to fracture.

Referring to Figure 4, the angle  $\alpha$  of the upper flank of the nose-shaped projection 14 relative to a plane X normal to the centre line Y of the neck finish is preferably not greater than about 70°, and the angle  $\beta$  of the lower flank of the projection is preferably not greater than 12°. It is preferred also that the distance between the top of the closure and the frangible bridges should be between 0.8 and 0.9 of the distance between the top and the projection 14. It is further preferred that the distance between the top of the closure and the frangible bridges should be between 0.6 and 0.75 of the overall height of the closure.

Figures 5 to 7 are views of a second embodiment of the invention and correspond respectively to Figures 1 to 3. Corresponding parts in the two embodiments are indicated by the same reference numerals. The neck finish in the embodiment of Figures 5 to 7 is similar but not identical to that of Figures 1 to 3. The angle of the surface 15 of the nose-shaped projection 14 is inclined at about 70° relative to plane X which is normal to the (vertical) axis of the bottle. A substantial length 35 of the skirt below the external groove 25 is of plain cylindrical form. Below the cylindrical part 35 is a relatively wide but shallow inwardly facing groove

36 in the middle of the base of which the bridges 31 are formed.

The application of the closure to the neck finish is carried out in manner broadly similar to that described in relation to the arrangement of Figures 1 to 3. The upper part of portion 35 is swaged into conformity with the screw-thread groove 12 and the portions of the tamper-evident ring 32 below groove 36 are swaged into conformity with the outermost parts of the projection 14. The bottom edge portion of the ring is pressed into close engagement with the surface of the container. The bridges remain spaced away from the neck finish.

The insertion of e.g. a levering instrument under the bottom edge portion of the ring to disengage the ring from groove 18 results in inward pivotal movement of the portions of the ring about the tip of the nose-shaped projection 14, the tip of the projection acting as a fulcrum. Since the bridges are radially spaced from the external surface of the neck finish, the radially inward movement of the adjoining parts of the ring places the bridges under stress and they fracture.

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### Claims

1. In combination, a container having a neck finish extending about a central axis of the container which neck finish provides a container mouth and an external screw thread adjacent the mouth, an annular outward projection which is spaced below the screwthread and which is nose-shaped in cross-section said projection having a lower flank disposed at a small angle to a plane normal to said central axis and an upper flank extending at a larger angle to said plane, said upper and lower flanks meeting in substantially a sharp edge, and an annular groove below the projection, and a roll-on metal closure comprising a top, a dependent skirt and a tamper-evident ring formed in one piece with the skirt and connected to the lower edge of the skirt by a series of frangible bridges, the skirt being deformed into engagement with the screw thread on the neck finish and the ring being deformed into close contact with the nose-shaped projection on the container and into engagement in said groove below the projection, and the bottom edge portions of the ring being deformed into close contact with the surface of the container, and said bridges being radially spaced from the outer surface of the container.
2. The combination claimed in claim 1 wherein the lower end portion of the skirt and the upper end portion of the ring jointly provide a radially inwardly facing groove, the bridges being formed

- in a wall of the groove which is radially spaced from the outer surface of the neck finish.
3. The combination claimed in claim 2, wherein the whole of the said end portions of the skirt and ring are radially spaced from the outer surface of the neck finish. 5
4. The combination claimed in any one of the preceding claims, wherein the distance between the top of the closure and the frangible bridges is between 0.8 and 0.9 of the distance between the top and the nose-shaped projection. 10
5. The combination claimed in any of the preceding claims, wherein the distance between the top of the closure and the frangible bridges is between 0.6 and 0.75 of the overall height of the closure. 15
6. The combination claimed in any one of the preceding claims, wherein the upper flank of the nose-shaped projection is inclined at an angle of 70° or less to said plane. 20
7. The combination claimed in any one of the preceding claims, wherein the lower flank of the nose-shaped projection extends at an angle of 12° or less to said plane. 25
8. A container having a neck finish extending about a central axis of the container which neck finish provides a container mouth and an external screw thread adjacent the mouth, an annular outward projection which is spaced below the screw-thread and which is nose-shaped in cross-section, said projection having a lower flank disposed at a small angle to a plane normal to said central axis and an upper flank extending at a larger angle to said plane, said upper and lower flanks meeting in substantially a sharp edge. 30
9. A container as claimed in claim 8, wherein an annular channel is formed below said outward projection. 35
10. A container as claimed in claim 8 or claim 9, wherein said lower flank of the nose-shaped projection forms also the upper side wall of said channel. 40
11. A closure or closure blank made from sheet metal and comprising a top, a dependent skirt and a tamper-evident ring formed in one piece with the skirt and connected to the lower edge of the skirt by a series of frangible bridges, the ring being formed adjacent said bridges with an annular grooved formation a portion of which is capable of forming an annular fulcrum in conjunction with a 45
- complementary annular surface of a container to which the closure or closure blank is to be applied such that radially outward force applied to the free lower edge portion of the ring causes the bridges and the portion of the ring above said groove to be deformed radially inwardly, said bridges being arranged to be radially spaced outward from the external surface of the container when the closure or closure blank is positioned thereon. 50
12. A closure or closure blank as claimed in claim 11 wherein the lower edge portion of the skirt and the upper edge portion of the ring jointly form a radially inwardly facing groove in which the frangible bridges are formed. 55
13. A closure or closure blank as claimed in claim 12 wherein the frangible bridges are formed in the lower flank of said radially inwardly facing groove.
14. A closure as claimed in claim 12 or claim 13, wherein said grooved formation includes a radially inwardly facing groove spaced below the first said groove, and an outwardly facing groove formed by the lower flank of the first said groove and the upper flank of the second said groove, the base of the second said groove constituting said fulcrum.
15. A closure or closure blank as claimed in claim 12 wherein the said groove is relatively wide and shallow and the frangible bridges are formed in the base of the groove.

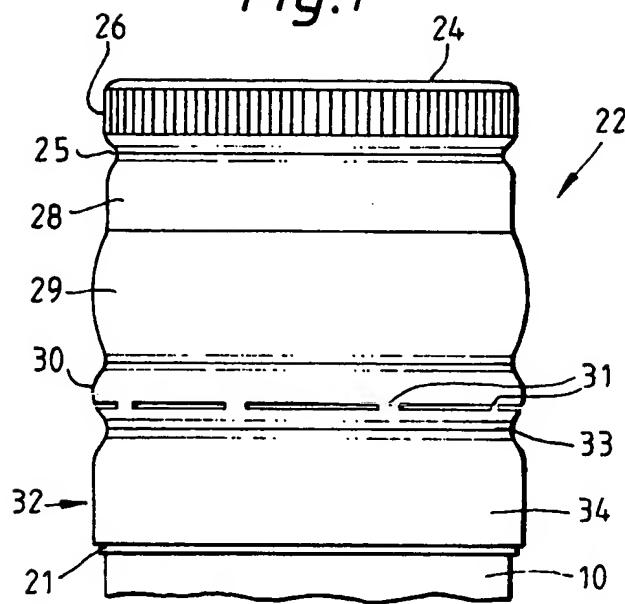
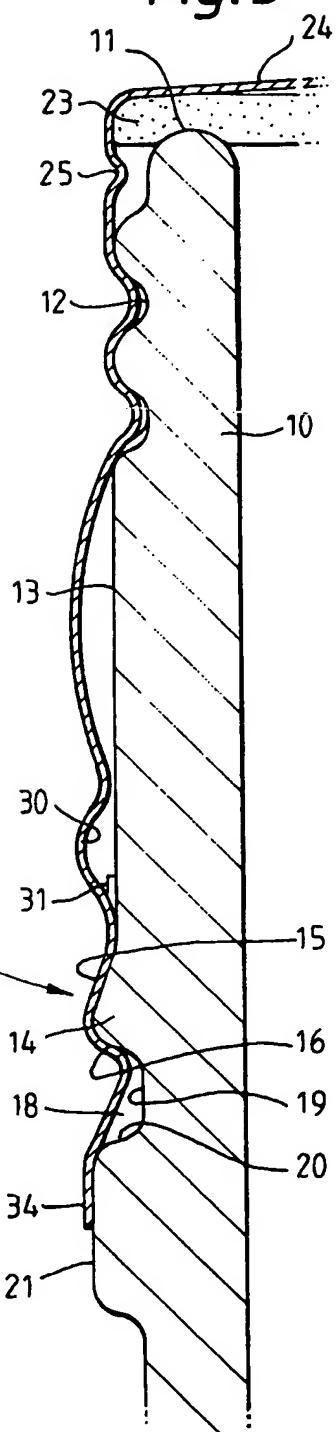
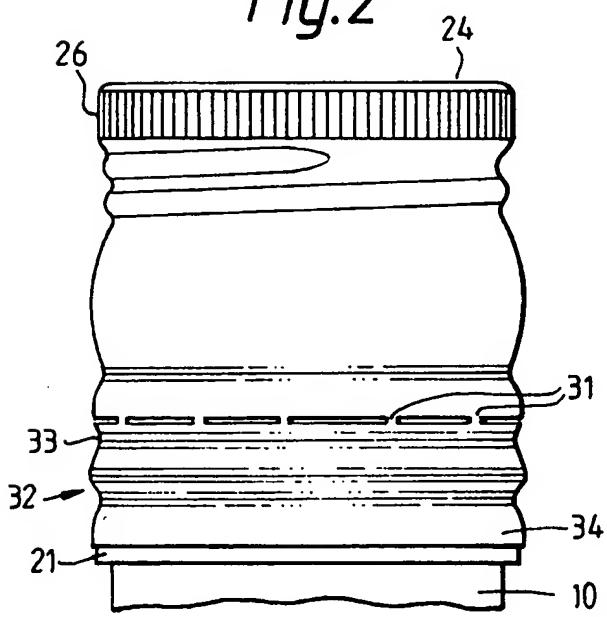
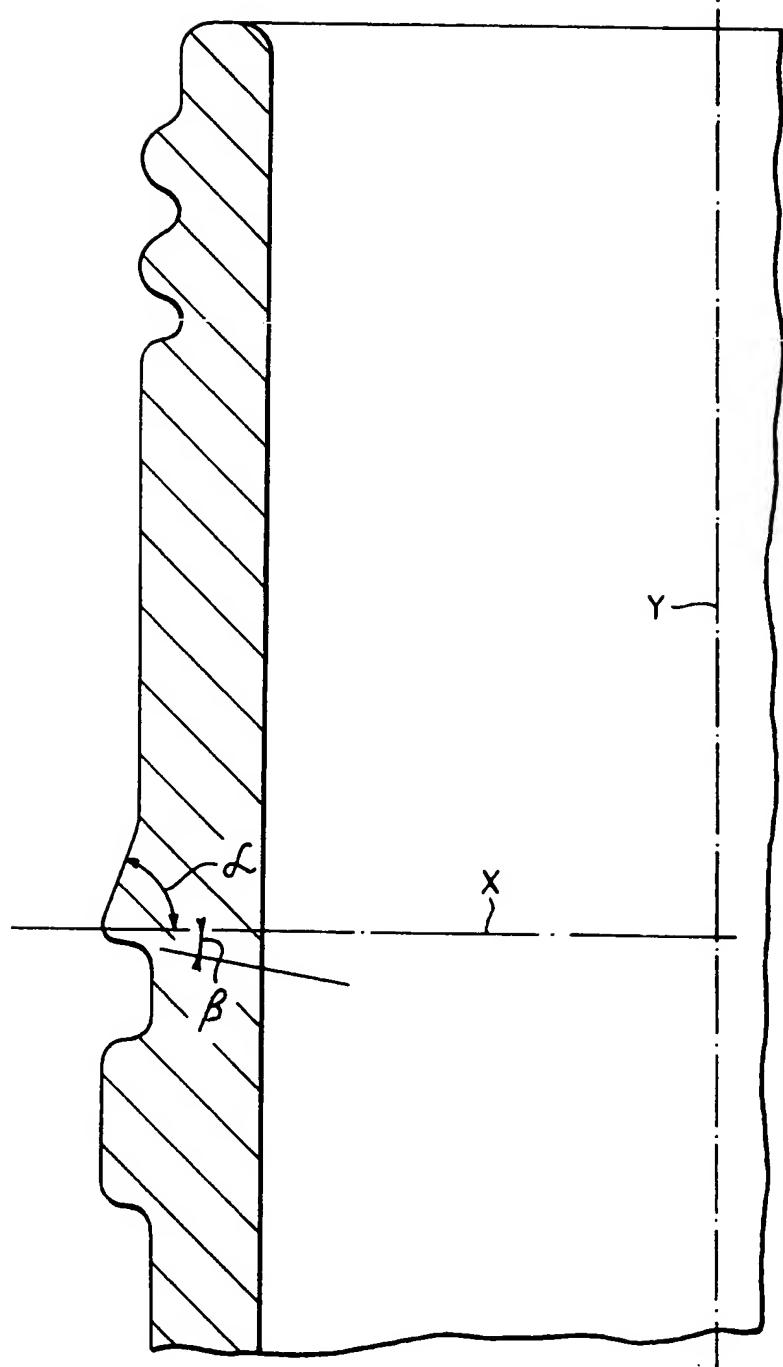
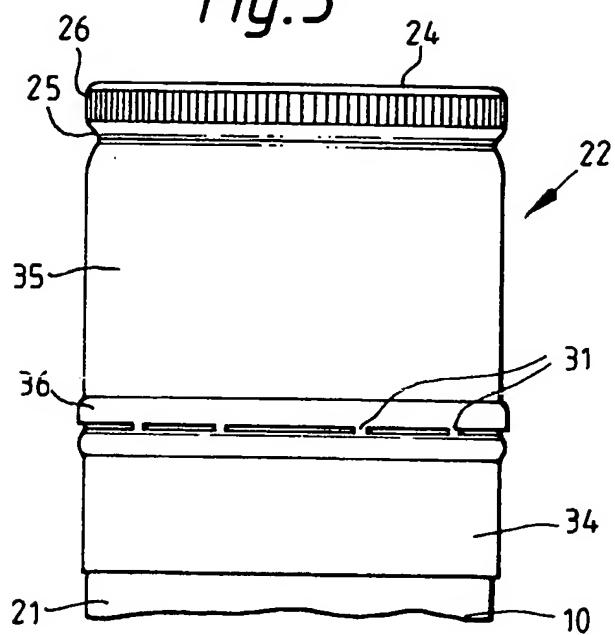
*Fig.1**Fig. 3**Fig. 2*

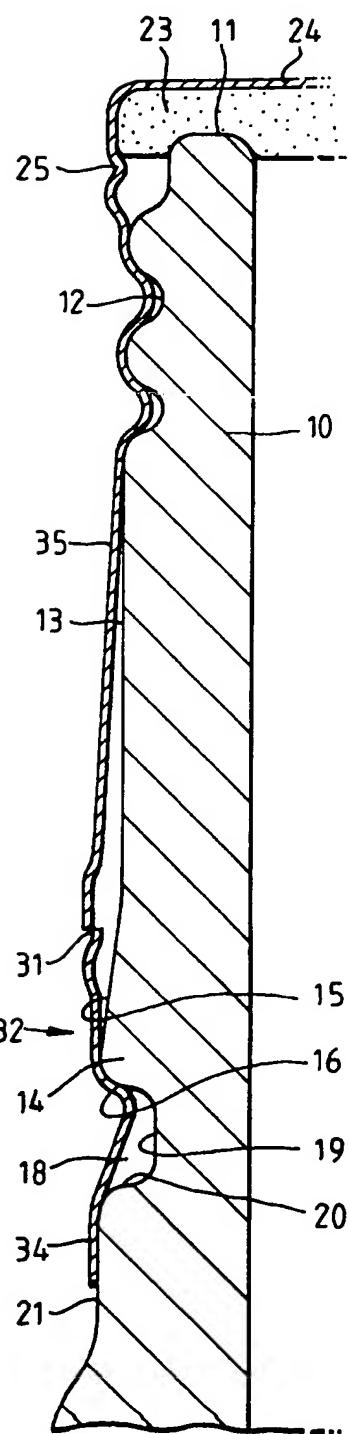
Fig.4



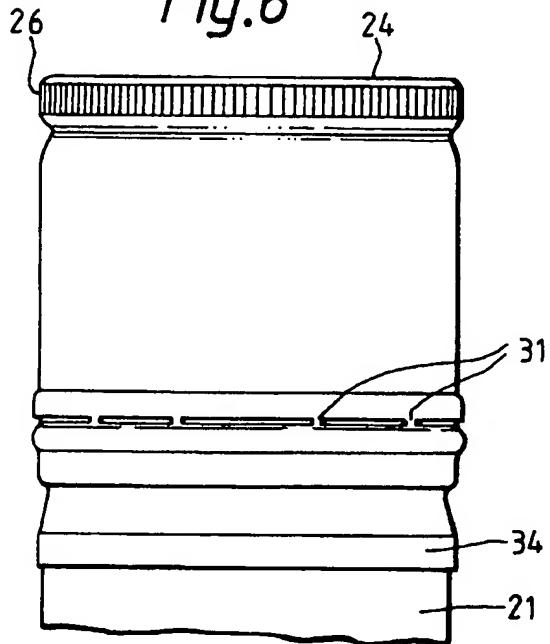
*Fig.5*



*Fig.7*



*Fig.6*





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## **EUROPEAN SEARCH REPORT**

**Application Number**

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